

Zennosuke IWATSUKI*: **Two interesting *Fissidens* species common to Japan and eastern North America****

岩月善之助*: 日本及び米国東部に共通の *Fissidens* の 2 種**

Among the mosses common to eastern Asia and eastern North America with a disjunct geographical range, there are *Homaliadelphus* and others (Iwatsuki 1958 a). As a matter of fact, about ten per cent of the Southern Appararian mosses are either recorded only from eastern North America and eastern Asia, or are related to Asiatic species (Iwatsuki, 1958 b).

Additional examples of species taking this distribution are two rare species of *Fissidens*. These examples of mosses support Asa Gray's opinion of the similarity of the floras of Asia and eastern United States.

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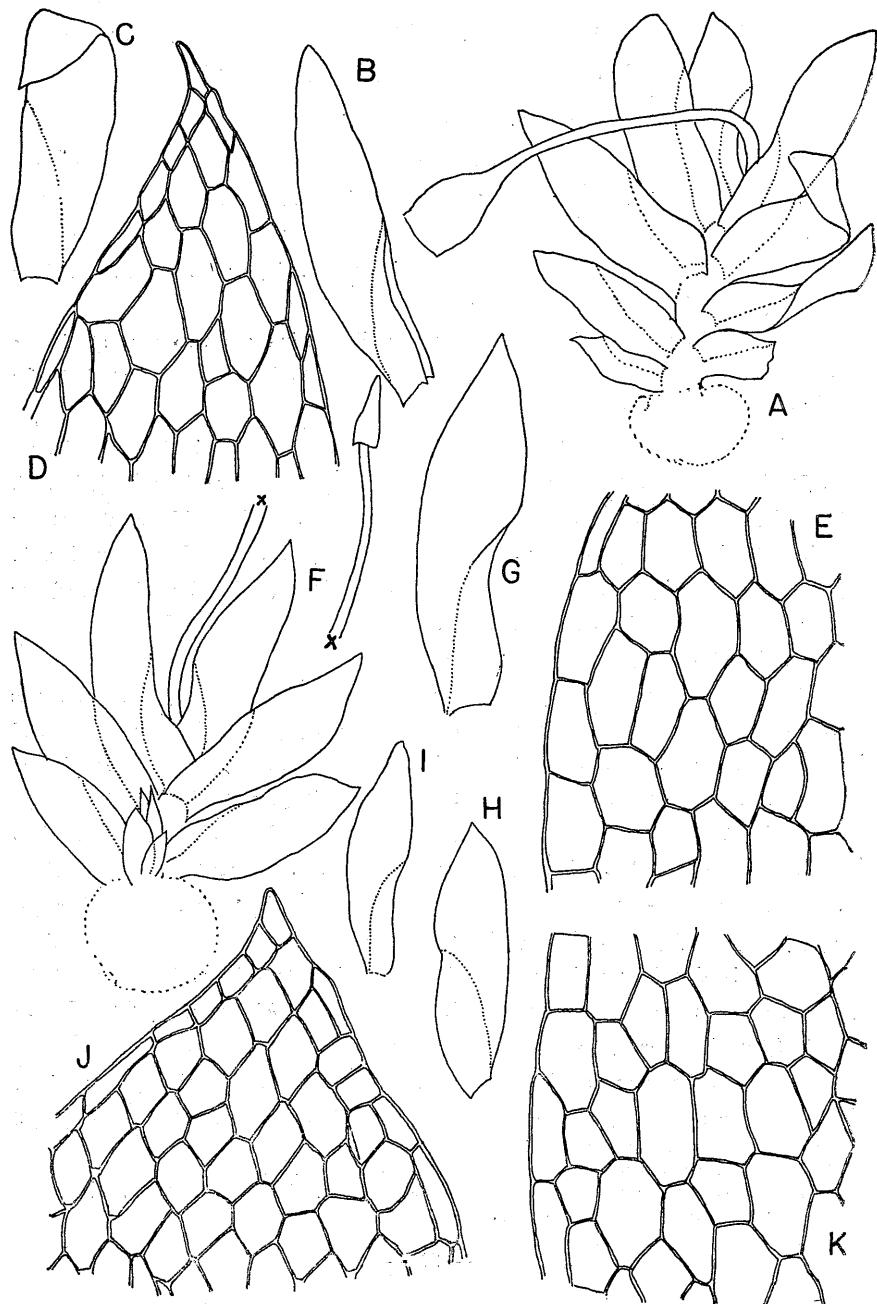
1. ***Fissidens hyalinus* Hooker and Wilson.**

This species is extremely rare and has been recorded in eastern United States from only two localities, Pennsylvania and Ohio. The Japanese plants were described under the name *F. satsumensis* Sakurai from Kagoshima, Kyushu, and recorded from Chiba, Honshu. They have characteristic phyllids belonging in the subgenus *Poly-podiopsis*. These are ecostate and composed of large, hyaline cells. The descriptions of *F. hyalinus* (Grout, 1936 and Jennings, 1951) and *F. satsumensis* (Sakurai, 1933) are essentially the same except as follows: (1) The American plants are taller (2-4 mm) than the Japanese plants (1-1.3 mm). (2) The phyllidial margins of American plants are bordered by a single row of narrow elongate cells while those of the Japanese plants are only partly bordered. (3) Oblong or oblong-ovoid (U.S.A.) versus ovoid (Japan) thecae.

However, the phyllids of the type specimen and Pennsylvanian plants of *F. hyalinus* are not clearly bordered as in the original description, but are weakly and

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partly bordered just as in the Japanese specimen. In the most cases the phyllidial tips are not bordered. The Japanese plants also have slightly smaller cells (25–55 μ long, 19–30 μ wide in the upper half of the phyllids) than those of the American plants (34–57 μ long, 22–34 μ wide). The habitats in both regions are quite similar, such as moist, rocky ledges; on ground or bank in shady ravines.

After careful examination of the descriptions and type specimens, I believe that these plants all belong to the same species, *F. hyalinus*. Another species, *Fissidens*

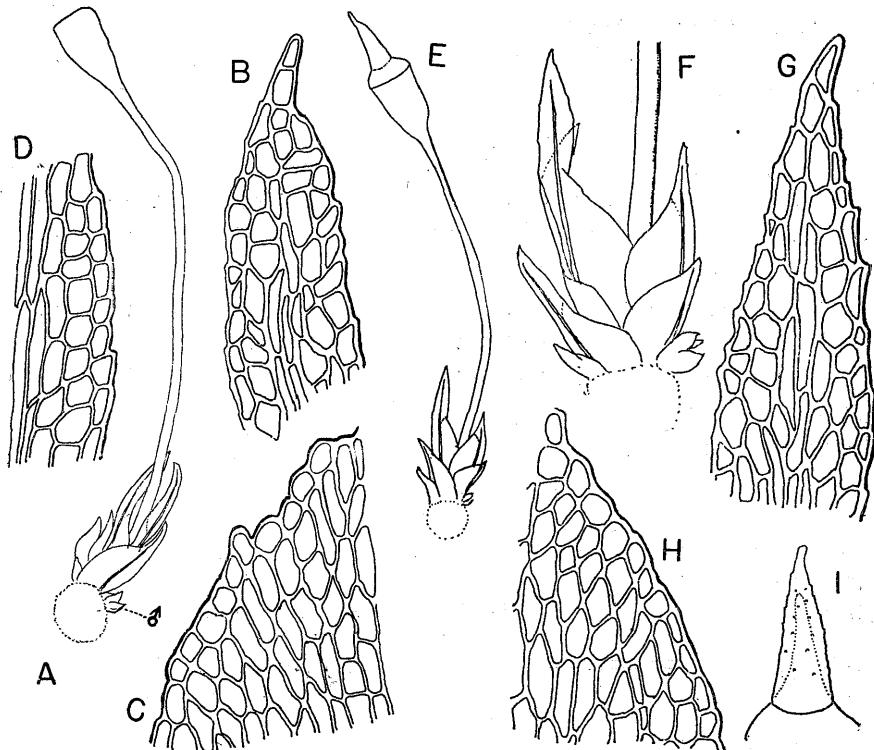


Fig. 2. *Fissidens closteri* Aust. A-D. Subspecies *kiushiuensis* (Sak.) Iwatsuki from Japan. E-I. Subsp. *closteri* from Closter, U.S.A. (Austin, 479). A, E. Plants, $\times 33$. B, G. Areolations at phyllidial tips, $\times 385$. C, H. Areolations at vaginant lamina, $\times 385$. D. Areolation at middle part of phyllid, $\times 385$. F. Plant, $\times 90$. I. Calyptra, 90.

Fig. 1. *Fissidens hyalinus* Hook. et Wilson. A-E. Isotype specimen of *F. satsumensis* Sak. from Japan. F-K. From Pennsylvania (Jennings, 10402). A, F. Plants, $\times 20$. B, C, G, H, I. Phyllids, $\times 33$. D, J. Areolation at phyllidial tips, $\times 237$. E, K. Areolation at middle part of phyllids, $\times 237$.

nymani (Fl.) Paris from Java, seems quite similar to this species.

Fissidens hyalinus Hooker and Wilson, Journ. Bot. 3: 89. 1841. Syn. *Fissidens satsumensis* Sakurai, Bot. Mag. Tokyo 47: 735. 1933.—syn. nov. *Polypodiopsis satsumensis* (Sak.) Tuzibe, Journ. Jap. Bot. 20: 113. 1944.

Specimens examined: U.S.A.; Ohio-Bank Lick, on Cassidy's farm, near Cincinnati, type of *F. hyalinus* (NY). Pennsylvania—near Lock No. 4, Monongahela river, Sept. 6, 1895. A. Linn, and J. S. Simonton 9. Japan; Kyushu—Izyuin, Kagoshima Pref., Feb. 3, 1931, Y. Doi 499, type of *F. satsumensis*.

2. *Fissidens closteri* Aust.

This species is very small, up to 0.5 mm in height, almost acaulescent and belongs in the subgenus *Aloma*. New Jersey, Rhode Island, Indiana and Puerto Rico are the known localities of this minute rare moss which hardly can be seen with the naked eye in the field. In the Herbarium of New York Botanical Garden there is a note written by Mrs. E. G. Britton. She compared *F. closteri* with *F. pauperulus* from California, and pointed out many differences between these two taxa. However, another closely related species has been found from a few localities in central to southern Japan under the name *F. kiushiuensis* Sakurai (Sakurai, 1933; Higuchi, 1953). The latter was compared with *F. crassinervis* S. Lac. from tropical Asia in the original description. *F. kiushiuensis* has characteristics similar to those of *F. closteri*. A careful comparison of the descriptions of the two species (Grout, 1936; Welch 1957 and Sakurai, 1933) showed the following differences:

	<i>Fissidens closteri</i>	<i>F. kiushiuensis</i>
Height	up to 0.5 mm	0.2 mm (caulid)
Number of phyllids	2-3 pairs	3-5 pairs
Size of upper phyllids	0.4-0.6 mm long	0.5-0.7 mm
Margin of phyllids	Entire or faintly crenulate with projecting cell angles to wavy	Crenulate all the way
Calyptra	2.5 mm long	0.02 mm long
Length of seta	1.75-2.5 mm	0.8-1.0 mm
Length of theca	0.25-0.4 mm	0.15 mm
Size of spores	8-12 μ in diam	15 μ

In addition to the above, the descriptions indicate that the caulid of *Fissidens closteri* has no central strand; its median phyllidial cells are 8-18 μ long, about 7 μ wide; and it is monoicous or pseudodioicous. The calyptra of *F. kiushiuensis* is weakly mammillose above.

An examination of the available specimens of the two species, including the types

(located in the herbaria of the New York Botanical Garden, Dr. W. H. Welch, and Dr. K. Sakurai) proved that the above distinctions are obscure, and that these species are essentially the same. The gametophores are similar in form and size. *F. kiushiuensis* has 2-3 pairs of phyllids excluding the perigonium which is attached to the base of the caudiculus as in *F. closteri*. Margins of the phyllids of both species are faintly crenulate. The size of the apical cells are the same (12-20 μ long, 9-12 μ wide). The length of the seta is very variable: in *F. closteri* (1.2-2.5 mm); and in *F. kiushiuensis* (0.8-3.0 mm). I examined some calyptre in the type specimen of *F. closteri*, and found that some of them are also mammillose toward the tip as shown in *F. kiushiuensis*. No difference was found in the size of the calyptre, thecae or spores of the two species.

However, the length of uppermost phyllids of *F. kiushiuensis* (0.6-1.0 mm) is longer and more slender than that of *F. closteri* (0.4-0.7 mm). Considering this difference and their disjunct distribution, I propose the following combinations.

Fissidens closteri* Aust., Bull. Torr. Bot. Club 5: 21. 1874. subsp. *closteri

Specimens examined: U.S.A.; New Jersey—near Closter, 1865, Austin—holotype (NY), Aug. 12, 1872 (NY); 1875 (NY) and Musci Appalachiani; Suppl. 1, no. 479 (NY) from same place by Austin. Indiana—Montgomery Co., Oct. 16, 1938, W. H. Welch.

subsp. ***kiushiuensis* (Sakurai)** Iwatsuki, stat. nov.

Syn. *Fissidens kiushiuensis* Sakurai, Bot. Mag. Tokyo 47: 741. 1933.

Specimens examined: Japan; Kyushu-Izyuin, Kagoshima Pref., Jan. 27, 1931, T. Doi 492—holotype. Udo Shrine, Miyazaki Pref., Feb. 25, 1956, Z. Iwatsuki and M. Mizutani 29150 (NICH). Honshu—Mt. Odaigahara, Mie Pref., April 3, 1954, Z. Iwatsuki 27820 (NICH). Iizaka, Fukushima Pref., Sept. 17, 1952, T. Higuchi 766.

The habitats of two subspecies are also similar, e.g., in crevices of decomposing rock; on rock in stream bed, or on small boulder on the forest floor.

The known range of these two species shows the typical disjunct distribution in Japan and eastern United States. Most of the Japanese mosses described or reported previously were compared more thoroughly with their related taxa in Europe. It seems probable that many of the mosses now thought to be endemic to Japan (or Asia) and North America were described without thorough comparison. On the other hand some of the common species reported previously from both these regions might be separated after critical study. For example, J. Cardot described a new variety

of Asiatic *Thuidium glaucium* (var. *ludovicianum*, from Florida, in 1905). However, this variety is now included in *T. allenii*, an endemic of eastern United States.

Recently some American bryophytes were described as new to science after thorough comparison with Asiatic plants. They are *Mnium carolinianum* Anderson (compared with *M. maximowiczii*), *Diphyscium cumberlandianum* Harvey (compared with *D. involutum*), and *Plagiochila yokogurensis* subsp. *fragilifolia* Schuster (compared with *P. yokogurensis*). I think that a more thorough comparison of these two bryophyte floras will reveal more interesting facts for plant geographers.

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